GE Medical Systems

Technical Publications

Direction 15501

Revision 4

Signa® Advantage™ and Horizon™ Hydrogen Only Spectroscopy

Operating Documentation

DAMAGE IN TRANSPORTATION

All packages should be closely examined at time of delivery. If damage is apparent, have notation "**damage in shipment**" written on **all** copies of the freight or express bill **before** delivery is accepted or "signed for" by a General Electric representative or a hospital receiving agent. Whether noted or concealed, damage **MUST** be reported to the carrier **immediately** upon discovery, or in any event, within **14** days after receipt, and the contents and containers held for inspection by the carrier. A transportation company will not pay a claim for damage if an inspection is not requested within this **14** day period.

Call Traffic and Transportation, Milwaukee, WI (414) 785–5052/8*323–5052 **immediately** after damage is found. At this time be ready to supply name of carrier, delivery date, consignee name, freight or express bill number, item damaged and extent of damage.

Complete instructions regarding claim procedure are found in Section "S" of the Policy & Procedure Bulletins.

3/12/92

GE Medical Systems

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WARNING

- **THIS SERVICE MANUAL IS AVAILABLE IN ENGLISH ONLY.**
- **IF A CUSTOMER'S SERVICE PROVIDER REQUIRES A LANGUAGE OTHER THAN ENGLISH, IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE TRANSLATION SERVICES.**
- **DO NOT ATTEMPT TO SERVICE THE EQUIPMENT UNLESS THIS SERVICE MANUAL HAS BEEN CONSULTED AND IS UNDERSTOOD.**
- **FAILURE TO HEED THIS WARNING MAY RESULT IN INJURY TO THE SERVICE PROVIDER, OPERATOR OR PATIENT FROM ELECTRIC SHOCK, MECHANICAL OR OTHER HAZARDS.**

AVERTISSEMENT

- **CE MANUEL DE MAINTENANCE N'EST DISPONIBLE QU'EN ANGLAIS.**
- **SI LE TECHNICIEN DU CLIENT A BESOIN DE CE MANUEL DANS UNE AUTRE LANGUE QUE L'ANGLAIS, C'EST AU CLIENT QU'IL INCOMBE DE LE FAIRE TRADUIRE.**
- **NE PAS TENTER D'INTERVENTION SUR LES ÉQUIPEMENTS TANT QUE LE MANUEL SERVICE N'A PAS ÉTÉ CONSULTÉ ET COMPRIS.**
- **LE NON-RESPECT DE CET AVERTISSEMENT PEUT ENTRAÎNER CHEZ LE TECHNICIEN, L'OPÉRATEUR OU LE PATIENT DES BLESSURES DUES À DES DANGERS ÉLECTRIQUES, MÉCANIQUES OU AUTRES.**

WARNUNG

- **DIESES KUNDENDIENST–HANDBUCH EXISTIERT NUR IN ENGLISCHER SPRACHE.**
- **FALLS EIN FREMDER KUNDENDIENST EINE ANDERE SPRACHE BENÖTIGT, IST ES AUFGABE DES KUNDEN FÜR EINE ENTSPRECHENDE ÜBERSETZUNG ZU SORGEN.**
- **VERSUCHEN SIE NICHT, DAS GERÄT ZU REPARIEREN, BEVOR DIESES KUNDENDIENST–HANDBUCH NICHT ZU RATE GEZOGEN UND VERSTANDEN WURDE.**
- **WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH ELEKTRISCHE SCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.**

AVISO

- **ESTE MANUAL DE SERVICIO SÓLO EXISTE EN INGLÉS.**
- **SI ALGÚN PROVEEDOR DE SERVICIOS AJENO A GEMS SOLICITA UN IDIOMA QUE NO SEA EL INGLÉS, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCIÓN.**
- **NO SE DEBERÁ DAR SERVICIO TÉCNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO.**
- **LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.**

ATENÇÃO

- **ESTE MANUAL DE ASSISTÊNCIA TÉCNICA SÓ SE ENCONTRA DISPONÍVEL EM INGLÊS.**
- **SE QUALQUER OUTRO SERVIÇO DE ASSISTÊNCIA TÉCNICA, QUE NÃO A GEMS, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, É DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.**
- **NÃO TENTE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA.**
- **O NÃO CUMPRIMENTO DESTE AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A‘ CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.**

AVVERTENZA

- **IL PRESENTE MANUALE DI MANUTENZIONE È DISPONIBILE SOLTANTO IN INGLESE.**
- **SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEMS RICHIEDE IL MANUALE IN UNA LINGUA DIVERSA, IL CLIENTE È TENUTO A PROVVEDERE DIRETTAMENTE ALLA TRADUZIONE.**
- **SI PROCEDA ALLA MANUTENZIONE DELL’APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO.**
- **NON TENERE CONTO DELLA PRESENTE AVVERTENZA POTREBBE FAR COMPIERE OPERAZIONI DA CUI DERIVINO LESIONI ALL’ADDETTO ALLA MANUTENZIONE, ALL’UTILIZZATORE ED AL PAZIENTE PER FOLGORAZIONE ELETTRICA, PER URTI MECCANICI OD ALTRI RISCHI.**

警告

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・この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。

注意:

- 本维修手册仅存有英文本。
- 非 GEMS 公司的维修员要求非英文本的维修手册时，客户需自行负责翻译。
- 未详细阅读和完全了解本手册之前，不得进行维修。
- 忽略本注意事项会对维修员，操作员或病人造成触电，机械伤害或其他伤害。

REVISION HISTORY

REV	DATE	PRIMARY REASON FOR CHANGE
A	Sept. 23, 1992	Initial Release.
0	Nov. 17, 1993	Updates and corrections.
1	Jul. 23, 1997	Updates and corrections.
2	Dec. 5, 1997	Updates to Section 1,2,3, 4, and 5. Remove references to Research Agreement and Research Key.
3	Mar. 31, 1998	Updates to all Sections.
4	Sept. 2, 1998	Updates to Sections 1 4, and 5.

LIST OF EFFECTIVE PAGES

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* This revision number/letter corresponds to the indicated document's revision control system.

TABLE OF CONTENTS

SECTION 1 – INTRODUCTION

Hydrogen Only Spectroscopy Option allows the user to obtain data and create a Spectrum to determine quantity of Hydrogen in a particular area of study. This option is similar to Broadband Spectroscopy option, but allows the acquisition of Hydrogen only. It does not allow acquisition of such elements as phosphorus, fluorine, sodium, etc.

The minimal software and hardware needed for installation is outlined below.

This manual will describe the installation items for 4.X, 5.X and 8.X systems. These include: An Option Key for all systems, Spectroscopy Surface Coil Quick Disconnect Adapter for 4.X and 5.X systems, an external PROBE Filter Kit for specified 8.X systems, and an EPROM for all systems using the ERBTEC RF Amplifier. For other hardware and software installation, refer to Directions listed in the outline.

1–1 SIGNA RELEASE 5.X 1.5T SYSTEMS

- M1040HT – Hydrogen Only Spectroscopy (includes 5.X Option Key, Spectroscopy Surface Coil Quick Disconnect Adapter, and EPROM).

1–2 SIGNA ADVANTAGE (4.X) 1.5T SYSTEMS

- M1040HS – Hydrogen Spectroscopy (includes Spectroscopy Surface Coil Quick Disconnect Adapter and EPROM).
- M1090KT – Key Tape (for installation refer to *Direction 15300, Signa Advantage System*, Set up and Calibration Tab, Section 6–6, SAVING EDITS AND LOADING KEY TAPE).

1–3 SIGNA RELEASE 8.X 1.5T SYSTEMS

- M1090LK – Hydrogen Only Spectroscopy (includes 8.X Option Key, EPROM, (and external PROBE Filter Kit for the original CERD).

SECTION 2 – SPECTRO EPROM INSTALLATION

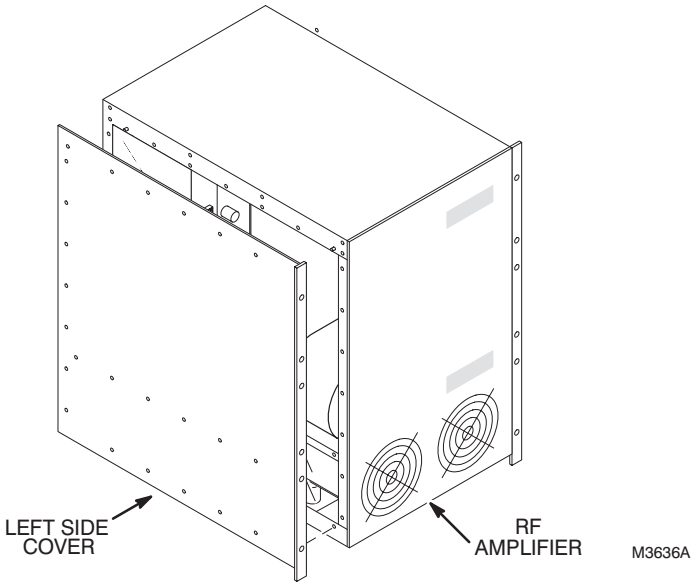
2–1 REMOVE RF AMPLIFIER COVERS

1. Verify the anti–tip stabalizer legs are installed on the RF/Pen Cabinet——these will prevent the Cabinet from tipping over.
2. If already ON and connected, turn OFF all RF/Pen Cabinet circuit breakers at rear of cabinet.
3. Disconnect power cable to RF/Pen Cabinet. Perform Lock–out/Tag–out procedures. (Refer to MR CD–ROM *Direction 2187583–3, MR Release 5.x Signa Service Methods,* navigate to System, SAFETY).
4. Remove RF/Pen Cabinet front door and open rear door.

CAUTION

Personal injury hazard. Cabinet may tip off if anti–tip legs are not in place. Make sure that anti–tip legs are installed before pulling RF Amplifier.

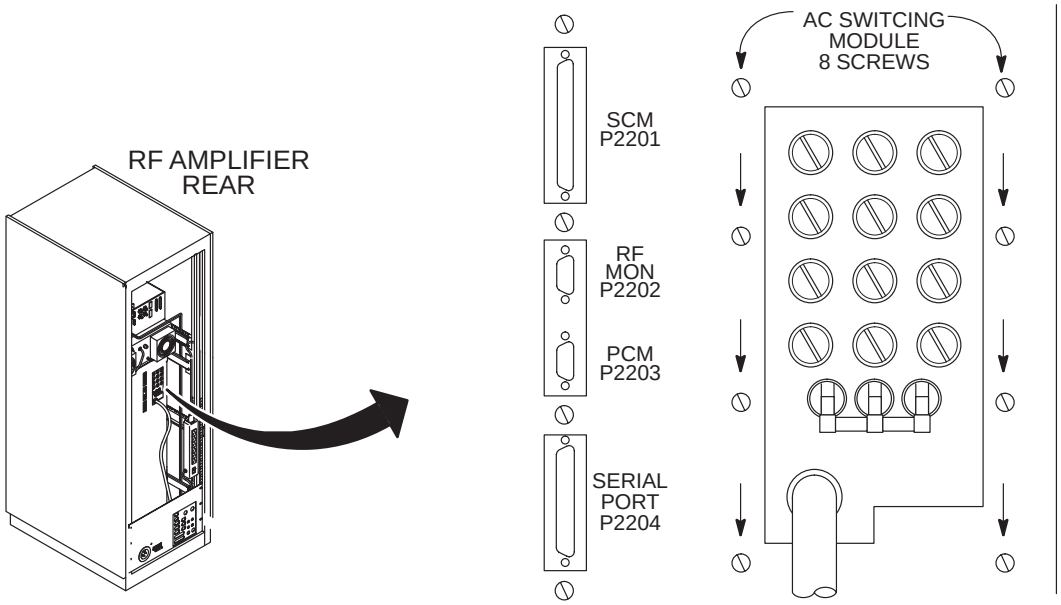
5. Verify that all LEDs are OFF on front of RF/Pen Cabinet.
6. Remove securing screws and pull RF Amplifier completely forward.
7. Remove Left Side Cover. See Illustration 2-1.
8. Locate Processor Board in Processor Cavity just behind AC Switching Module (see Illustration 2-3). Place a service cloth, paper or cardboard piece over High Voltage Cavity to catch any hardware that may drop.
9. Push RF Amplifier back into the cabinet.



REMOVE RF AMPLIFIER COVERS
ILLUSTRATION 2-1

2–2 REMOVE AC SWITCHING MODULE

1. Remove eight 8–32 x 3/8 screws securing AC Switching Module from outside of rear panel. See Illustration 2-2.

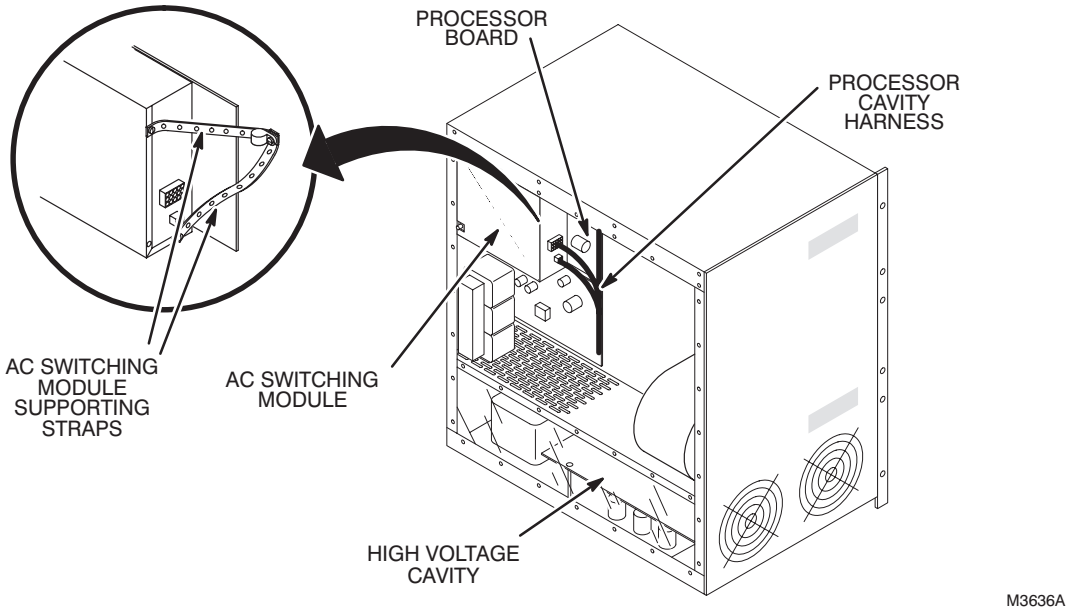


REMOVE SCREWS AND CABLES FROM REAR OF AMPLIFIER
ILLUSTRATION 2-2

2. Pull RF Amplifier completely forward and locate AC Switching Module.

2–2 REMOVE AC SWITCHING MODULE (Continued)

3. Support the AC Switching Module with one hand and remove supporting straps from module by removing two screws. See Illustration 2-3.



PROCESSOR AND AC SWITCHING MODULE LOCATION
ILLUSTRATION 2-3

4. Lift up slightly on module and remove it towards front of amplifier to slide off locating stud on rear panel.

5. It may be necessary to disconnect the two Processor Cavity Harness connectors (P2101 and P2102) from AC Switching Module unit by grasping connector, depressing locking tabs, and rocking connector housing while pulling gently. DO NOT PULL WIRES.

6. Feed Power cord through rectangular opening in rear panel and remove AC Switching module. Rest module on the floor.

2–3 INSTALL EPROM

1. Locate Processor Board (now exposed with AC switching module removed).

CAUTION

Processor Board and Components are static sensitive. Board components may be damaged if not handled in a static free environment. Take appropiate precautions (e.g. wear properly grounded wrist strap and use a grounding mat) when handling this board.

2. Locate and remove U17 on Processor Board. See Illustration 2-4.

3. Mark the original U17 EPROM as **original** and store it in the static bag supplied for the Proton Spectroscopy Eprom. Install new EPROM (from M1090HS, M1090HT, or M1090LK kit) at U17 location. See Illustration 2-4.

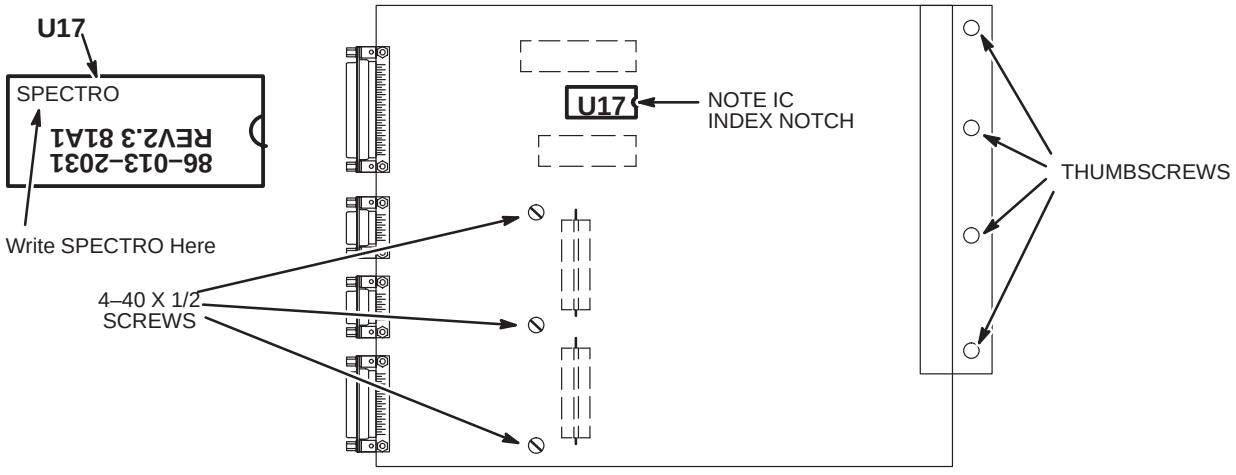
4. Note that per Illustration 2-4 the label affixed to the EPROM is usually upside–down. Write the word Spectro on the white label of the new EPROM. Install new EPROM (46–320103P1 from M1040HT kit) at U17 location. See Illustration 2-4. The static bag containing the original U17 EPROM must be marked as **Original Processor Board U17 EPROM** on the outside of the static bag and it should be visablly stored in the MR1 RF/Pen Cabinet by taping the static bag to the front of the Amplifier (usually it is placed near the air intake filter).

Note

This **original** EPROM must be replaced on the Processor Board and Proton Spectro EPROM must be retained if replacing the RF Amplifier or the Processor Board.

Note

The Spectro EPROM is designated by a checksum of 81A1.



EPROM (U17) LOCATION ON PROCESSOR BOARD
ILLUSTRATION 2-4

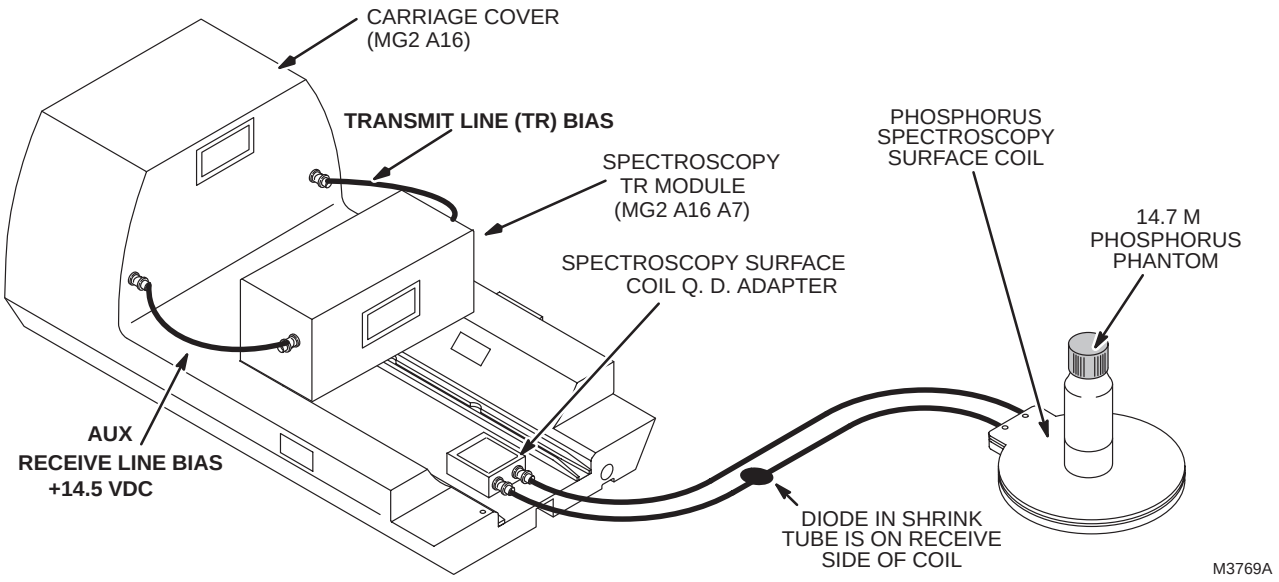
2–4 RE–ASSEMBLE AMPLIFIER

1. Position removed AC Switching Module in Processor Cavity with power cord fed through rectangular opening in rear panel. The DANGER message should be facing out.
2. Locate stud on interior side of rear panel and line it up with hole in module. The stud provides locationing and support while securing the unit.
3. Support module by fastening straps. See Illustration 2-3.
4. Plug in two connectors (P2102, P2101) from Processor Cavity Harness making certain orientation is correct and pins are properly seated. The connector will click when tabs have fully locked.
5. Push RF Amplifier back into the cabinet.
6. Attach module to rear panel by first loosely securing with eight 8–32 x 3/8 screws. Securely tighten all screws. See Illustration 2-2.
7. Pull RF Amplifier completely forward. Remove service cloth, cardboard or paper used to catch falling hardware.
8. Blow out unit with dry compressed air.
9. Replace all covers with all screws.

SECTION 3 – QUICK DISCONNECT MODULE (QD PLUG) (4.X AND 5.X SYSTEMS ONLY)

3–1 INSTALL MULTI–NUCLEAR SPECTROSCOPY SURFACE COIL QUICK DISCONNECT ADAPTOR

The Spectroscopy Surface Coil Quick Disconnect Adaptor (46–282467G4) is used with Multi–Nuclear Spectroscopy Surface Coils in association with the Multi–Nuclear Spectroscopy TR Module and Coil. Refer to the proper Spectroscopy Subsystem Direction (15370 for 4.X to 5.4, or 2151387 for 5.7) for use. Refer to Illustration 1–1.



MULTI–NUCLEAR SPECTROSCOPY HARDWARE
ILLUSTRATION 1–1

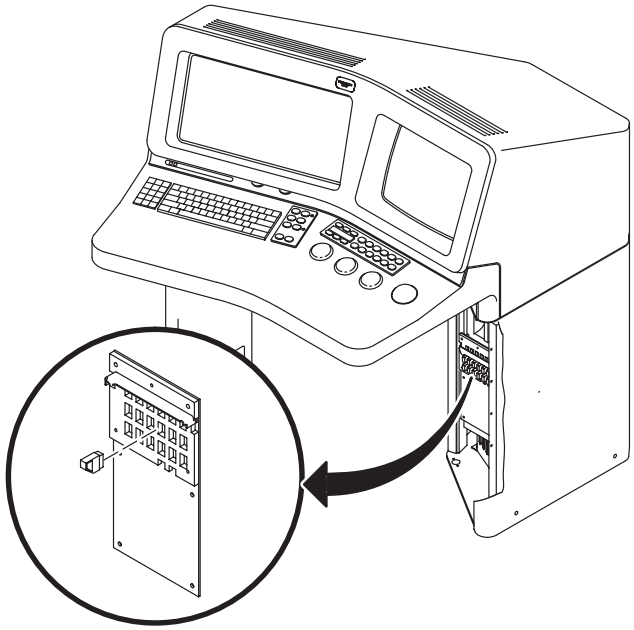
SECTION 4 – SPECTRO OPTION KEY (5.X ONLY)

4–1 INSTALL SPECTRO OPTION KEY, 5.X

To install the Spectro Option Key from M1040HT, refer to Illustration 4–1 and Illustration 4–2.

Note

4.X Systems should not have received these items. 4.X Systems use a Key Tape (M1090KT) in place of these items. Refer to *Direction 15300, Signa Advantage System*, Set up and Calibration Tab, Section 6–6, SAVING EDITS AND LOADING KEY TAPE to install Key Tape.



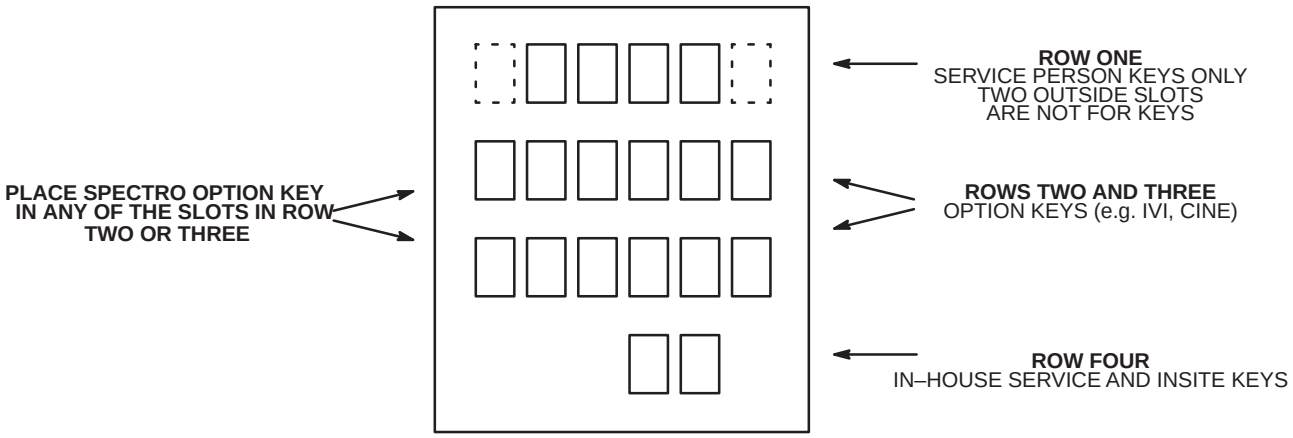
STEP 1
REMOVE FRONT COVER
OF CONSOLE PEDESTAL

STEP 2
LOCATE PROPER KEY SLOT

STEP 3
INSERT KEY INTO SOCKET
PRESS FIRMLY
BUT DO NOT DAMAGE PINS

M3724A

OPTION KEY LOCATION
ILLUSTRATION 4–1



SECURITY BOARD KEY SLOT ASSIGNMENTS
ILLUSTRATION 4–2

The Option Key needs to be in place at all times if Spectroscopy is to be operational. If removed, Spectroscopy can be reinitialized by bringing the system down, inserting the key and then bringing the system back up again.

Once installed, the Option Key is site specific and cannot be moved from one system to another.

4–2 PROBE CALIBRATION

1. Perform PROBE/SV Calibration and SNR: Refer to Dir 2187583–3 MR Release 5.x/8.x Signa Service Methods CDROM, 5.x Setup and Cals, PROBE/SV Calibration and SNR procedure.

SECTION 5 – HORIZON LX SPECTRO OPTION KEY AND FILTER INSTALLATION (8.X ONLY)

5–1 PROBE OPTION INSTALLATION

1. Insert the 3.5” PROBE Option floppy (2162029) disk into the host (SGI) floppy disk drive or MOD (2209596) in MOD drive. See Illustration 5–1.

2. From the Service Desktop, click on **[Install]**.

3. A window called Install will open with request to “Type Root Password”:

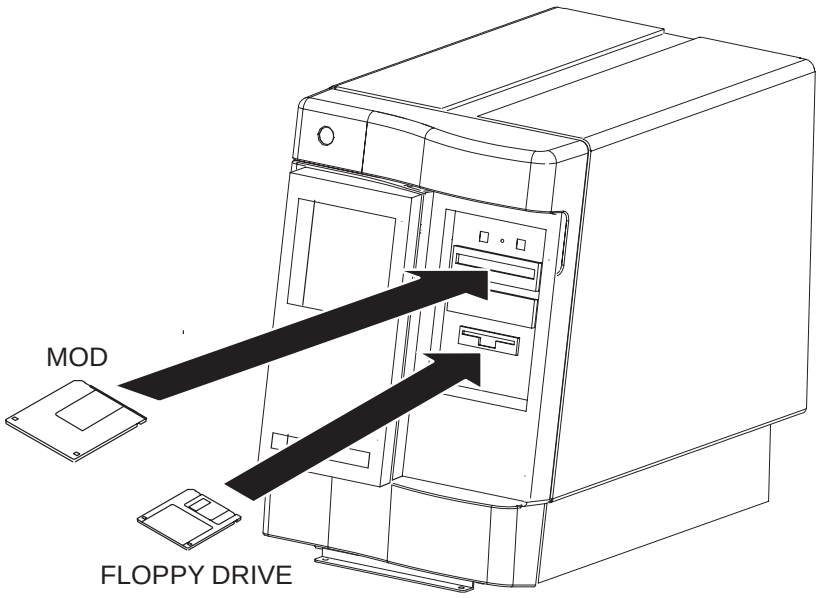
   Type **operator <Enter>**.

4. A window will open. Select **[Option Install].**

5. Locate the option name at the bottom of the window, and click on **[Change Status].** The floppy or MOD, with the software option will be accessed, and the software will load. Notice that the status changes from *unavailable* to *available.*

6. Select **[Quit].**

7. Remove floppy disk or MOD.



OPTION KEY LOCATION
ILLUSTRATION 5–1

5–2 EXTERNAL PROBE FILTER INSTALLATION FOR 1.5T CERD (EXCITER 2148300–2 ONLY)

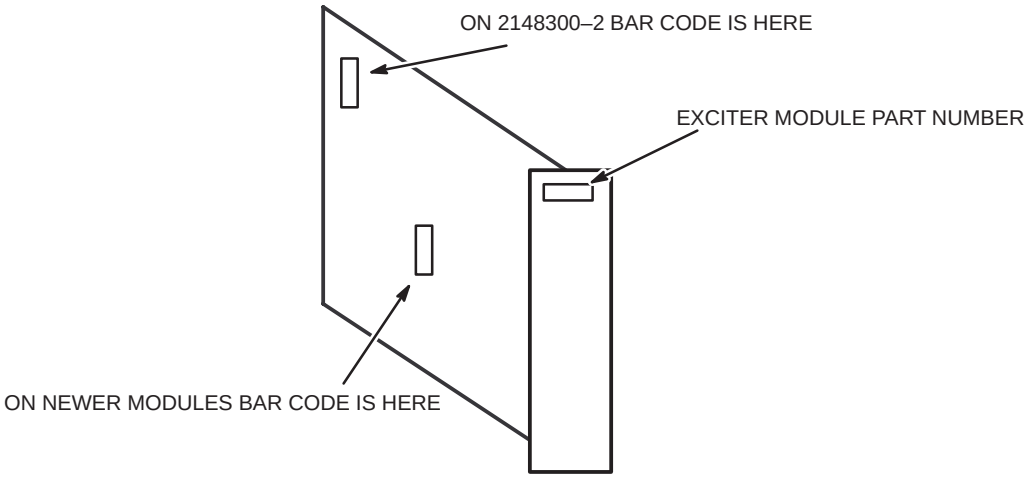
1. Verify 1.5T CERD Exciter Module part number/type. See Illustration 5–2

Note

The original CERD (Exciter Module 2148300–2) required an external PROBE Filter Kit. If the PROBE Option is purchased and the system has an original CERD (Exciter Module 2148300–2), but the required external PROBE Filter Hardware is not present, order the part numbers per Illustration 5–3.

Note

A new CERD has been introduced. The newer CERD **does not use** the external PROBE Filter. Visual verification is required to identify CERD on site. See Illustration 5–2



PROBE FILTER KIT MUST BE INSTALLED WITH –2 CERD

2148300–2 CERD EXCITER MODULE VERIFICATION
ILLUSTRATION 5–2

To Install the External PROBE Filter Kit for the Original –2 CERD ONLY:

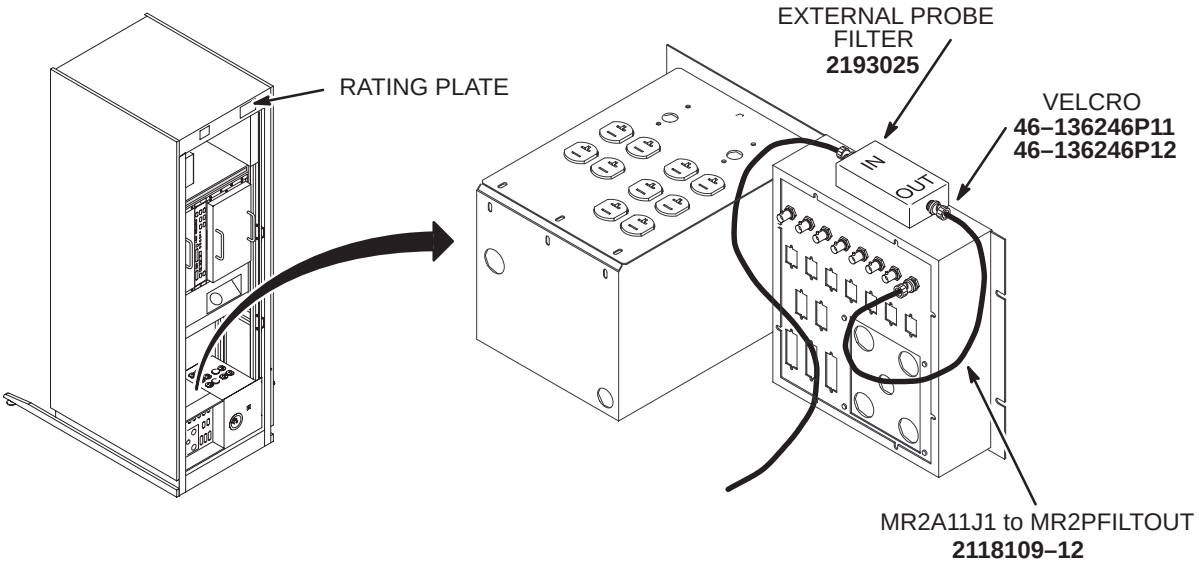
2. Disconnect MR2 A11 J1 from the Interface Panel in the System Cabinet (interior of cabinet I/F panel) and connect it to end of the PROBE filter labelled IN. See Illustration 5–3.

3. Using the cable provided in the kit (M1090LK), connect one end of the cable to the BNC connector on the filter labelled OUT and the other end of the cable to the MR2 A11 J1 connector on the Interface Panel.

4. Use the supplied Velcro tape to mount the filter to the top of the Interface Panel as shown in Illustration 5–3.

5–2 EXTERNAL PROBE FILTER INSTALLATION FOR 1.5T CERD (EXCITER 2148300–2 ONLY), (Continued)

ORDER THE PROBE FILTER KIT FOR USE WITH THE –2 CERD



EXTERNAL PROBE FILTER KIT LOCATION / PARTS
ILLUSTRATION 5–3

Note

The PROBE Filter adds approximately 3.5 dB (–3.5 dB, ± 0.5 dB) of loss to the system which must be compensated for by re–performing the RF Power Calibrations.

5. Add rating plate as shown in Illustration 5–3 and send installation card to Product Locater.

5–3 RF POWER OUTPUT CALIBRATION

1. Perform APB or APM Calibration. Refer to Dir 2187583–3 MR Release 5.x/8.x Signa Service Methods CDROM, LX Setup and Cals for site specific RF/PEN Cabinet (1 or 2), select APB or APM Calibration respectively.

5–4 PROBE/SV CALIBRATION AND SNR

1. Perform PROBE/SV Calibration and SNR: Refer to Dir 2187583–3 MR Release 5.x/8.x Signa Service Methods CDROM, LX Setup and Cals, PROBE/SV Calibration and SNR procedure.